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Pollock, K.G.; Wallace, L.A.; Wrigglesworth, S.; McMaster, D.; Steedman, N.

*Published in:*
Vaccine

*DOI:*
10.1016/j.vaccine.2018.11.081

*Publication date:*
2019

*Document Version*
Author accepted manuscript

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Pollock K.G.[1,4*], Wallace L.A. [1], Wrigglesworth S.[2], McMaster D.[2], Steedman N. [2,3]

[1] School of Health and Life Sciences, Glasgow Caledonian University, Cowcaddens Road, Glasgow, UK

[2] Information Services Division, Gyle Square, Edinburgh, UK

[3] Scottish Government, Edinburgh, UK

[4] Health Protection Scotland, Meridian Court, Cadogan St, Glasgow, UK

[*] Corresponding author: Kevin.pollock@gcu.ac.uk

**Keywords**: MSM; HPV; vaccine; sexual health

**Abstract**

Human papillomavirus (HPV) vaccines are currently utilised globally in national immunisation programmes. In July 2017, a national HPV vaccine programme for men who have sex with men (MSM) was initiated across Scotland with vaccine being offered in the sexual health clinic setting. During the first year of this targeted vaccination programme, there were 5,905 individuals who received at least one dose of HPV vaccine, representing 63.7% of eligible MSM attendees in this period. Vaccine uptake was relatively stable across all age groups (range 49.8-55.5%). The vaccination programme appears to have dovetailed well with pre-existing sexual health services and appears to be popular with MSM attending the service. The MSM HPV vaccine programme is a robust adjunct to the national girls programme but gender-neutral immunisation will reduce stigma and inequality in HPV-driven disease.

## Introduction

Since 2008, school-based uptake in Scotland of the HPV vaccines in girls aged 12–13 has been impressive, with vaccine uptake sustained at levels approximating 90% (Sinka *et al.* 2014). We have recently reported on the effect of the bivalent vaccine on the prevalence of HPV types in women immunised routinely at age 12 or 13 years who attended for screening at age 20, where virtual abolition of HPV 16 and 18 infections was observed (Kavanagh *et al.* 2017). Indeed, the prevalence of virus (0.5%) was comparable in vaccinated and unvaccinated women, demonstrating significant herd protection against the two most prevalent oncogenic HPV types known to precipitate anogenital and oropharyngeal cancers (Lin *et al.* 2017; Chaturvedi *et al.* 2013).

A HPV vaccination programme for men who have sex with men (MSM) aged up to and including 45 years old who attend sexual health and/or HIV clinics commenced in Scotland in July 2017 (CMO Directorate, 2017). The vaccine is administered irrespective of HPV infection status. The programme was initiated by the Scottish Government based on advice from the UK Joint Committee on Vaccination and Immunisation (JCVI, 2015), which recognised that MSM receive little benefit from the national schools' HPV programme in girls. Furthermore, HPV anogenital infection and related disease is disproportionately higher in MSM who are significantly more likely than heterosexual men to develop anal cancer (Piketty *et al.*. 2012).

We present national vaccine uptake data for the first year of this selective immunisation programme for MSM attending sexual health clinics in Scotland.

## Methods

The National Sexual Health IT System (NaSH) is currently used by all eleven mainland Scottish NHS board sexual health services (SHS) to record patient attendances. Denominator numbers of MSM were identified as those who attended 81 sexual health services during the first full year of the MSM HPV immunisation programme (1st July 2017 to 30th June 2018), who were age ≤ 45 years at the time of attendance, and where the patient sex was male and gender of lifetime sexual partners was recorded as "men and woman" or "men only". Immunisation status of these 'eligible MSM' was derived from prescription data on NaSH during the same 12 month period, with three prescriptions (or doses) of Gardasil considered 'Complete' for adults and 2 doses for those under 15 years of age. Due to the flexibility in the Gardasil summary of product characteristics (SPC), variable spacing options for the doses are possible. This enables the administration of subsequent doses to be aligned with recommended GUM re-attendance, routine investigations for HIV+ MSM, or other care.

Age of those vaccinated was based on the age at first prescription (i.e. when the patient first started the HPV programme) and NHS board was based on the most recent appointment location. Patients had to have a valid sexual health clinic appointment linked to their prescription. This was required to consistently identify age and NHS board. Non-linking records were excluded (43, 0.7%). Data were extracted in October 2018.

## Results

During the first year of this targeted opportunistic vaccination programme, there were 5,905 individuals who received at least one dose of HPV vaccine. This represents a percentage first dose uptake of 63.7% of eligible MSM attendees in this period (table 1). Vaccine uptake was relatively stable across all age groups (range 49.8-55.5%). Few (447 of 5905, 7.6%) were aged under 20. In this time period, 3,367 MSM who attended sexual health services (36.3%) were eligible for HPV vaccination by age and lifetime sexual history but did not begin the programme.

**Table 1. Uptake of HPV vaccine in MSM within Scotland by age group (patient immunisation status was based on their most recent Gardasil prescription prescribed as at 30 June 2018).**

| Age band (years) | Number of MSM attending | Immunisation Status | | | Percentage Uptake (%) | | |
|---|---|---|---|---|---|---|---|
| | Individuals | Complete | In Progress | Total | Complete | In Progress | Total |
| <20 | 708 | 54 | 393 | 447 | 7.6 | 55.5 | 63.1 |
| 20-24 | 2,443 | 242 | 1,330 | 1,572 | 9.9 | 54.4 | 64.3 |
| 25-29 | 2,403 | 297 | 1,221 | 1,518 | 12.4 | 50.8 | 63.2 |
| 30-34 | 1,597 | 223 | 801 | 1,024 | 14.0 | 50.2 | 64.1 |
| 35-39 | 1,163 | 161 | 579 | 740 | 13.8 | 49.8 | 63.6 |
| 40-45 | 958 | 117 | 487 | 604 | 12.2 | 50.8 | 63.0 |
| **Total** | **9,272** | **1,094** | **4,811** | **5,905** | **11.8** | **51.9** | **63.7** |

## Discussion

The implementation and roll-out of the HPV vaccination programme in MSM within Scotland has been successful with a moderately high first dose uptake. The vaccination programme, designed to be opportunistic, has been accommodated into pre-existing sexual health services and is popular with MSM attending the service. Furthermore, the 1st dose uptake of 64% correlates well with estimates used in cost-effectiveness models (Lin *et al*, 2017). The HPV programme commenced simultaneously with the offer of pre-exposure prophylaxis (PrEP) to eligible HIV-negative individuals, which presented significant logistical challenges for those delivering sexual health services. Limitations of this analysis include the fact that NaSH is not currently used by the three Scottish Island Boards (Orkney, Shetland & Western Isles), and not by some mainland HIV Services. Work is ongoing with these services to determine numbers of those eligible for the HPV vaccine among the HIV cohort and those vaccinated in non-NaSH using sexual health sites and in the prison setting, though numbers are predicted to be small.

The first dose uptake of 64% in Scotland broadly compares with other devolved UK nations where first dose uptake has been estimated to be 77% in specific areas of Wales (Knapper *et al.* 2018), 65% in Northern Ireland (HSCNI PHA, 2017) and 46% in England, albeit the latter figure was estimated through a pilot evaluation rather than national roll-out (PHE, 2018). While the offer of vaccine through sexual health clinics appears to be well-received, approximately 36% of eligible MSM attending sexual health clinics that are eligible for the vaccine have not commenced it and these men presumably remain at risk of acquiring new HPV infections. Given that 50% of MSM in Scotland are infected with a vaccine-specific HPV, the importance of increased vaccine uptake in this at-risk population cannot be understated (Cameron *et al.* 2018). Future analyses will detail the clinical impact of the programme in both the short and longer term.

**Acknowledgements**

The authors thank all those who work across sexual health services within Scotland for their efforts in delivering excellent service.

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